4. Each minor planet will be observed at least five times, near opposition, when practicable.

5. Observations of the list of miscellaneous stars will be finished as soon as practicable.

THE TRANSIT INSTRUMENT

1. Observations will be made as often as practicable for time, for the correction of the standard meantime clock; and computations will be made daily for such correction.

2. Observations for the right ascensions of the sun, moon, and inner planets to be made as frequently as possible; observations of the major planets, and of the brighter of the minor planets, to be made near opposition.

3. The observations made during 1883 will be prepared for publication; and the computations of those of 1884 continued.

THE 9·6-INCH EQUATORIAL

Observations will be made:—

1. Of all the minor planets whose brightness at opposition is greater than their mean brightness.
2. Of comets, to determine position and physical peculiarities.
3. Of occultations of stars by the moon.
4. When arrangements shall have been made to photograph the sun, any sun-spots which show any decided peculiarities in the photographs will be examined with the spectroscope.

THE PRIME VERTICAL TRANSIT INSTRUMENT

Observations of a selected list of stars in conjunction with the Royal Observatory at Lisbon, in pursuance of the plan recommended by the International Geodetic Association, for the determination of variability of latitude.

TIME-SERVICE AND CHRONOMETERS

The time-balls at Washington and New York will be dropped daily at noon of the 75th meridian; and the noon signals will be extended to such other places throughout the country as may be desirable, as rapidly as arrangements may be made.

The rating of chronometers will be continued as heretofore.

Meteorological observations will be made as usual.

THE MURAL CIRCLE

Observations will be made of stars down to the 7th magnitude south of ten degrees North declination, the positions of which have not been recently determined at some northern observatory; the observing list to be formed of all stars from Gould's Uranometria Argentina visible here, and not found in Yarnall's Catalogue, the Transit Circle list of B.A.C. stars, or the recent Catalogue of the Glasgow Observatory.

SCIENTIFIC SERIALS

Rendiconti del Reale Istituto Lombardo, January 29.—On a special class of involutions of space known as monoidal, by Dr. V. Martinetti.—Analysis of the meteorological observations made at the Brera Observatory, Milan, during the year 1884, by E. Pini.—An experimental study of the thermic phenomena accompanying the formation of alloys, by Prof. Domenico Mazzotto.—On some eruptive rocks occurring between Lakes Maggiore and Orta, by Prof. Giuseppe Mercalli.—On the geometrical movement of invariable systems, by Prof. C. Formenti.—International right in connection with the proposed Italian penal code, by Prof. A. Buccellati.—Meteorological observations taken at the Brera Observatory during the month of January.

February 12.—On the psychological act of *attention* in the animal series, by E. T. Vignoli.—On S. Grimaldi's project of an agrarian credit as a remedy for existing evils among the agricultural classes in Italy, by P. Manfredi.—On a class of configurations of the third power, by Prof. G. Jung.—On the geometrical movement of invariable systems, by Prof. C. Formenti.—On an integer more general than that of living forces for the movement of a system of material points, by Dr. G. Pennacchietti.—Integration of the differential equation $\Delta^2 u = 0$ in some very simple planes, by Prof. G. Ascoli.

Sitzungsberichte der Naturwissenschaftlichen Gesellschaft Isis, Dresden, 1884.—The organs of smell in the articulated animals, by Dr. Kraepelin.—An account of the Papuan inhabitants of Aru, Eastern Archipelago, communicated in a private letter to H. Engelhardt.—On *Anguillula radicicola*, a parasite infesting the coffee-plant on the Brazilian plantations, by B. Frank.—Phytological observations made on the flora of Dresden during the years 1883 and 1884, by A. Wobst.—On the morphology of the orchids, by Dr. O. Drude.—On the diluvial fauna of the Prohlis district, by Dr. Geinitz.—Remarks on some rare crystals of zircon and pyrites from Cornwall and Ontario, Canada, by A. Purgold.—On some archæological objects from Saxony, the Harz, and Italy, apparently connected with superstitious practices, by H. Wiechel.—On the chemical constitution of the colouring substance known as methylic blue, by Dr. R. Möhlau.—Memoir on new and little-known bird's eggs and nests from the Eastern Archipelago, specimens of which are possessed by the Dresden Zoological Museum, by A. B. Meyer.—On the latest geological researches in North America, by Dr. H. B. Geinitz. Remarks on the crepuscular phenomena observed in Europe and elsewhere at the end of the year 1883 and beginning of 1884, by Prof. G. A. Neubert.

Rivista Scientifico-Industriale, January 31.—Influence of static electricity on lightning conductors (concluded), by Prof. Eugenio Canestrini.—On the Westinghouse compressed air continuous brake, by the Editor.—Improved method of preserving ornithological specimens, by Dante Roster.

SOCIETIES AND ACADEMIES

LONDON

Royal Society, March 5.—"On the Atomic Weight of Glucinum (Beryllium)." Second Paper. By T. S. Humpidge, Ph.D., B.Sc., Professor of Chemistry in the University College of Wales, Aberystwyth. Communicated by Prof. E. Frankland, F.R.S.

This paper is a continuation of one previously communicated to the Royal Society (*Proc. Roy. Soc.*, vol. xxxv. p. 137). The author has prepared a sample of metallic glucinum, having the composition—

Gl	99·20
GlO	0·70
Fe	0·20
	100·00

and has determined its specific heat at varying temperatures up to 450° with the following results (for pure glucinum):—

c^{11}_{100}	0·4286
c^{13}_{145}	0·4515
c^{11}_{193}	0·4696
c^{15}_{240}	0·4885
c^{14}_{312}	0·5105
c^{11}_{360}	0·5199
c^{17}_{447}	0·5403

These results correspond to the following empirical formula for the true specific heat of the metal at varying temperatures—

$$k_t = k_0 + 2\alpha t + 3\beta t^2,$$

or with numerical values—

$$k_t = 0·3756 + 0·00106t - 0·000001 14t^2,$$

whence the following values for k_t are calculated:—

k_0	0·3756
k_{100}	0·4702
k_{200}	0·5420
k_{300}	0·5910
k_{400}	0·6172
k_{500}	0·6206

If these values are graphically represented the curve so obtained reaches a maximum at about 470°, and then falls; but whether it represents the specific heat at higher temperatures than 500° is doubtful. The specific heat of glucinum thus rises rapidly up to about 400°, and remains approximately constant between 400° and 500° at 0·62. If this number is multiplied by 9·1 it gives the atomic heat 5·64. Glucinum, therefore, belongs to the same class as carbon, boron, and silicon, which agree with Dulong and Petit's rule at high temperatures only. And the true atomic weight is that required by the periodic law—viz. 9·1 and not 13·6, as was previously deduced from the specific heat between 10° and 100°.

This conclusion is confirmed by the author's determinations of the vapour-densities of glucinum chloride and bromide in a platinum vessel. The experiments were done in an atmosphere of carbonic acid collected over mercury after Meier and Crafts (*Berlin. Ber.*, xiii. 851), and gave the following results:—

I. *Glucinum Chloride*

		Substance	Displaced CO_2	t	d
Experiment	i.	26·4 mgrms.	7·47 c.c.	635°	2·733
,,	ii.	28·0 ,,	7·98 ,,	785°	2·714

The theoretical density of $Gl''Cl_2$ is 2·76, and this formula, therefore, represents the molecule of this compound.

II. *Glucinum Bromide*

		Substance	Displaced CO_2	t	d
Experiment	ii.	35·9 mgrms.	4·28 c.c.	608°	6·487
,,	iii.	61·1 ,,	7·53 ,,	630°	6·276
,,	iv.	26·0 ,,	3·22 ,,	606°	6·245

The density of $Gl''Br_2$ is 5·84, and that of $Gl'''Br_3$ is 8·76. The agreement in this case is not so close as in the case of the chloride, but is sufficiently near to show that the true molecular formula is $Gl''Br_2$, and not $Gl'''Br_3$. Thus, the vapour-density of both compounds necessitates the atomic weight 9·1. The result is a striking argument in favour of the value of deductions drawn from the periodic law in regard to the atomic weight of an element, and shows that such deductions will in future form one of the most important factors in fixing a doubtful atomic weight. The author did not appreciate the full value of the periodic law when he wrote his former paper, otherwise he would probably have stated his conclusions less positively.

Zoological Society, March 3.—Prof. W. H. Flower, F.R.S., President, in the chair.—Dr. E. Hamilton made some remarks on the supposed existence of the Wild Cat (*Felix catus*) in Ireland, as stated at a former meeting, observing that there was no record of the Wild Cat being indigenous to that country. Dr. Hamilton believed that the cat shown at the meeting in question was only the offspring of domestic cats born and bred in the woods of that district.—A letter was read from Mr. J. H. Thomson, C.M.Z.S., giving the locality of *Helix* (*Hemitrochus*) *filicosta*, which had been previously unknown.—Dr. A. Günther, F.R.S., exhibited and made remarks on the skin of a singular variety of the Leopard which had been obtained in South Africa. The back in this specimen was black, and the tail reddish gray, while the usual characteristic spots of the ordinary leopard were nearly altogether absent.—Mr. H. H. Johnston, F.Z.S., gave a general account of the principal animals observed by him during his recent journey to Kilimanjaro and his stay on that mountain.—Mr. Oldfield Thomas read a report on the Mammals obtained and observed by Mr. Johnston during his expedition.—Capt. G. E. Shelley read a report on the birds collected by Mr. H. H. Johnston in the Kilimanjaro district. The collection contained examples of fifty species, six of which were believed to be new to science.—Mr. Charles O. Waterhouse read a paper on the insects collected on Kilimanjaro by Mr. H. H. Johnston, and gave the descriptions of six new species of Coleoptera, of which examples occurred in the collection.—Prof. F. Jeffrey Bell read a description of a Nematoid Worm (*Gordius vermeosus*) obtained by Mr. Johnston on Kilimanjaro, which was found to be parasitic on a species of *Mantis*.—Mr. E. J. Miers communicated the description of a new variety of River-Crab of the genus *Thelphusa* (*T. depressa*, Krauss, var. *Johnstoni*), which had been obtained by Mr. H. H. Johnston in the streams of Kilimanjaro.—Mr. Francis Day read the fourth of the series of his papers on races and hybrids among the Salmonidæ, continuing the account of the Howietown experiments from November, 1884, to the present time.—Prof. Ray Lankester read some notes on the heart described by Sir Richard Owen in 1841 as that of *Apteryx*, and came to the conclusion that the heart in question was that of an *Ornithorhynchus*.

Chemical Society, February 19.—Dr. W. H. Perkin, F.R.S., President, in the chair.—The President announced that Mr. Warren de la Rue, F.R.S., had presented a bust of the late Prof. Dumas. The following papers were read:—On benzoylacetic acid and some of its derivatives, part 2, by Dr. W. H. Perkin, jun.—On toughened filter-paper, by F. E. H. Francis.—The detection and estimation of iodine, by Ernest H. Cook, B.Sc. (Lond.).—Note on methylene chlor-iodide, by Prof. J. Sakurai.—A quick method for the estimation of phosphoric acid in fertilisers, by J. S. Wells, Columbia College.—On the luminosity of methane, by Lewis T. Wright, Assoc.M.Inst.C.E.—On the oxides of nitrogen, by Prof. W. Ramsay and J. Tudor Cundall. In this research it is shown—(1) That the green or blue liquid obtained by the action of arsenious anhydride on nitric acid consists of a mixture of nitrous anhydride and nitric peroxide, in proportions depending on the strength of the nitric acid and the temperature at which the volatile liquid is condensed. (2) That if a dehydrating agent, such as sulphuric acid, be present in sufficient quantity the distillate consists of pure peroxide, and that this process is by far the most convenient one for the preparation of the peroxide. (3) That if oxygen be passed over the blue liquid, the vapours condensed in a freezing mixture are still blue or green; a great excess of oxygen is necessary to effect conversion from nitrous anhydride into peroxide. (4) That when excess of nitric oxide is passed along with the peroxide into a cooled bulb, the trioxide is produced, the amount of trioxide depending on the temperature of the condenser. (5) Vapour-density of a liquid of a deep blue colour, containing about 30 per cent. of trioxide and 70 per cent. of peroxide, shows that the trioxide cannot exist in the gaseous state, but at once dissociates into nitric oxide and peroxide on changing to gas. The theoretical vapour-density of such a mixture was calculated from a formula deduced from the second law of thermodynamics by I. Willard Gibbs, which shows the relations between temperature, pressure, and vapour-density of the mixture of NO_2 and N_2O_4 in the gaseous peroxide; and it was found that the vapour-densities of a mixture of $(NO_2 + N_2O_4)$ (partly present in the original liquid as peroxide, partly formed by the decomposition of the N_2O_3 present into NO and $(NO_2 + N_2O_4)$) with the NO produced by the decomposition of the N_2O_3, calculated by means of Gibbs' formula, are identical, within limits of experimental error, with those obtained by direct experiment. (6) The presence or absence of moisture does not appear to affect the reaction between NO and O_2. (7) It is probable that N_2O_3 undergoes dissociation with rise of temperature, even while liquid.—Discussion:—Dr. Armstrong said that he had listened to the paper with great interest, as he had made numerous experiments on the subject, and had long been of opinion that N_2O_3 did not exist, at all events as gas. The authors' observations, whereby they were led to this conclusion, were of considerable importance, and it was to be hoped that ere long confirmatory evidence that would more directly appeal to chemists would be forthcoming. It was noteworthy that there was no recorded evidence proving the existence of N_2O_3 as gas. Gay-Lussac's experiments, published in 1816, showed that nitric oxide and oxygen only reacted in the proportions to form N_2O_4, and that reactions in proportions corresponding with the production of N_2O_3 only took place in presence of alkali. The method adopted by the authors did not suffice to prove the existence of N_2O_3, even as liquid, and the results could be equally well interpreted on the assumption that they were dealing with a solution of NO in N_2O_4. It was to be expected that N_2O_4 would be a good solvent of NO, as it appeared to be the rule that bodies which are related are easily miscible, phosphorus, for example, being very soluble in PCl_3, and sulphur in CS_2 and S_2Cl_2. One observation made by the authors did, however, support their view, viz. the observation that the blue liquid was with great difficulty oxidised by passing oxygen into it. In all his experiments, Dr. Armstrong had found that the reactions attributed to N_2O_3 could be equally well affected by a mixture of N_2O_4 and NO. As to the action of arsenious oxide on nitric acid, in his opinion, *nitrous acid* was *the* product, and the manner in which this underwent change entirely depended on the conditions. In dilute solution, NO would be produced in accordance with the equation: $3HNO_2 = 2NO + HNO_3 + H_2O$; but in presence of nitric acid the reaction $HNO_2 + HNO_3 = N_2O_4 + H_2O$ would take place, and would more and more preponderate the less the amount of water present. The addition of sulphuric acid would of necessity favour the latter mode of change. When N_2O_4 is passed into sulphuric acid, nitrosyl sulphate and nitric acid are formed; in presence of NO the latter is reduced to nitrous acid which also forms nitrosyl sulphate with the sulphuric acid, so that a mixture of NO and N_2O_4 in proper proportions precisely acts as though it were N_2O_3.

Anthropological Institute, March 10.—Francis Galton, F.R.S., President, in the chair.—The election of G. F. Legg was announced.—Mr. James G. Frazer read a paper on certain burial customs as illustrative of the primitive theory of the soul. The Romans had a custom that when a man who had been reported to have died abroad returned home alive, he should enter his house, not by the door, but over the roof. This custom (which is still observed in Persia) owed its origin to certain primitive beliefs and customs with regard to the dead. The ghost of an unburied man was supposed to haunt and molest the living, especially his relatives. Hence the importance attached to the burial of the dead; and various precautions were taken that the ghost should not return. When the body of a dead man could not be found, he was buried in effigy, and this fictitious burial was held to be sufficient to lay the wandering ghost, for it is a principle of primitive thought that what is done to the effigy of a man is done to the man himself.—The director read a paper by Admirel F. S. Tremlett, on the sculptured dolmens of the Morbihan. About eighty sculptures had been found, invariably on the interior surfaces of the cap-stones and their supports. It is remarkable that they are confined within a distance of about twelve miles, and are all situated near the sea-coast, beyond which, although the megaliths are numerous, there is a complete absence of sculptures. The sculptures vary in intricacy from simple wave-lines and cup-markings to some that have been compared to the tattooing of the New Zealanders.

Geological Society, February 25.—Prof. T. G. Bonney, F.R.S., President, in the chair.—Bennett Hooper Brough, Parvati Nath Datta, Robert Stansfield Herries, William Herbert Herries, Rev. Edward Jordon, Lees Knowles, and William Hobbs Shrubsole were elected Fellows of the Society.—The following communications were read:—On a dredged skull of *Ovibos moschatus*, by Prof. W. Boyd-Dawkins, F.R.S.—On fulgurite from Mont Blanc, by Frank Rutley, F.G.S.—On brecciated porfido-rosso-antico, by Frank Rutley, F.G.S.—Fossil Chilostomatous Bryozoa from Aldinga and the River Murray Cliffs, South Australia, by Arthur Wm. Waters, F.G.S. The seventy three fossils described in the present paper were collected by Prof. Ralph Tate, and, with a few exceptions, are from Aldinga and the River Murray Cliffs, Australia. This collection again furnishes interesting cases of species growing in both the Eschara and the Lepralia form; but the chief interest is in a number of specimens which grow in a "cupulata" manner, thus in the mode of growth resembling *Lunulites*. Attention was again called to the fact that, though the shape and nature of the zoœcial avicularia (onychocellaria) are characters of the greatest value, yet their presence or absence cannot be made a specific distinction, as there are a large number of cases where specimens are found with none or only a few such avicularia, whereas on other specimens of the same species, collected under similar circumstances, they may occur abundantly over the whole colony, or in parts of the colony, in large numbers. In the *Challenger* Report, Mr. Busk refers to a slender process rising from the middle of the base of the avicularian mandible, and names it "columella." This he considers only occurs in one division of the *Celleporæ*, and in this division only in those belonging to the southern hemisphere. This was shown to be by no means the case, as it is found in the mandibles of *Cellepora sardonica* from the Mediterranean, in two other common Mediterranean *Celleporæ*, &c. In many species there is a denticle in this position rising from the calcareous bar which divides the avicularium. This denticle occurs in various genera and species, and may often be found a useful specific character when examining fossils. Out of the 220 species now described in this series of papers, just about one-half are now known living. The species noticed in this paper are seventy-three in number, referred by the author to the genera *Cellaria*, *Membranipora*, *Micropora*, *Monoporella*, *Steganoporella*, *Cribrilina Mucronella*, *Microporella*, *Lunulites*, *Porina*, *Lepralia*, *Smittia Schizoporella*, *Mastigophora*, *Retepora*, *Rhynchopora*, *Cellepora*, *Lekythopora*, and *Selenaria*. Five species are described as new, namely, *Microporella pocilliformis*, *Lepralia confinita*, *Cellepora biradiata*, *Schizoporella protensa*, and *Membranipora temporaria*.

Victoria Institute, March 16.—Mr. W. P. James read a paper on the relation of fossil botany to theories of evolution, in which he gave a *résumé* of the whole question with which his paper dealt.

EDINBURGH

Mathematical Society, March 13.—Mr. George Thom, Vice-President, in the chair.—Mr. George A. Gibson read a paper on Gilbert's method of treating tangents to confocal conicoids. —Mr. J. S. Mackay gave an account of Schooten's geometry of the rule —Mr. A. Y. Fraser read a note by Mr. P. Alexander on two definite integrals.

PARIS

Academy of Sciences, March 9.—M. Bouley, President, in the chair.—Obituary notices of the late M. J. A. Serret, Member of the Section for Geometry, by MM. Jordan, Bonnet, Faye, and Renan.—Methods of observing the polar stars at a great distance from the meridian, with a table containing the corrective term intended to facilitate the reductions, by M. M. Lœwy.—Bromuretted substitutions of the polyatomic phenols, by MM. Berthelot and Werner. Here the authors deal with resorcine ($C_{12}H_6O_4$) and orcine ($C_{14}H_8O_4$) diatomic phenols, each of which furnishes a tribromuretted substance capable of being employed in their quantitative analysis.—On the decomposing action exercised by the chloride of aluminium on certain hydrocarburets, by MM. C. Friedel and J. M. Crafts.—Report on the new gallery of palæontology in the Paris Natural History Museum, by M. A. Gaudry. This gallery, which has been fitted up in the Whale Court, contains specimens of *Megatherium Cuveri*, *Elephas meridionalis*, *Mastodon augustidens*, *Cervus megaceros*, *Testudo elephantina*, *Pelagosaurus typus*, *Palæotherium magnum*, and some other gigantic extinct animals.—Observations of the planet 245, discovered by M. Borrelly at the Observatory of Marseilles, by M. Stephan.—On some anomalies in the phenomenon of tides in connection with M. Hatt's work, by M. de Jonquières.—Report on the International Congress of Washington, and on the resolutions there adopted respecting the first meridian, the universal hour, and the extension of the decimal system to the measurement of angles and of time, by M. J. Janssen, representative of France at the Congress. The report, which is partly occupied with M. Janssen's address objecting to Greenwich, and advocating a neutral first meridian at the Azores or Behring's Straits, concludes with the words: "However this be, and apart from the question of the meridian, which is not yet decided, let us not forget that the accession of England to the convention for the metrical system and the wish expressed for its general extension are important results, showing that our presence in Washington has not been useless either for science or progress."—Report on M. Léauté's memoir on oscillations at long intervals in machines propelled by hydraulic action, and on the means of preventing those oscillations, by M. Phillips.—Observations of Encke's comet made at the Observatory of Paris (equatorial coudé), by M. Périgaud.—Spectroscopic studies, by M. Ch. V. Zeuger. The author submits a method for clearing from the field of vision all rays except those lying nearest to the C band, and for thus observing, by means of the parallelopiped of dispersion, the protuberances proper to hydrogen under the monochromatic red light.—A method of avoiding the dangers incident to mechanical generators of electricity: reply to M. Daussin's claim to priority of invention, by M. A. d'Arsonval.—Study of the means employed to take the potential of the atmosphere: electromotor force of combustion, by M. H. Pellat.—On the decomposition of salts by water, by M. H. Le Chatelier. The author, against the generally-accepted views, formulates and demonstrates the two following propositions:—(1) The quantity of free acid required to resist the decomposition of a salt in solution increases indefinitely with the proportion of the salt contained in the fluid; (2) the decomposition of a salt in solution increases or diminishes with the changes of temperature, according as this decomposition absorbs or liberates heat.—On the separation of titanium from niobium and zirconium, by M. Eug. Demarçay.—On the normal pyrotartaric and succinic nitriles ($CN-(CH_2)-CN$; and $CN-(CH_2)_2-CN$), by M. Louis Henry.—On the preparation, properties, and reactions of iodacetone, by MM. P. de Clermont and P. Chautard.—Heat of formation of the glyoxal bisulphide of ammoniac, by M. de Forcrand.—Researches on the colouring matters of leaves; identity of the orange-red matter with carotine, $C_{18}H_{24}O$, by M. Arnaud.—On the analogies with and differences between the genus Simœdosaurus of the Cernay fauna, Rheims district, and the genus Champsosaurus of Erguelinnes, by M. V. Lemoine.—Underground rumblings heard on August 26, 1883 (date of the Krakatoa eruption), at the island of Caiman-Brac, Caribbean Sea, 20° N. lat., 80° E. long., by M. F. A. Forel.—Remarks on the three first numbers of Rossi's decennial *Bulletin* of the Observatory and central geodynamic Archives of Rome, by M. Daubrée.

BERLIN

Physical Society, February 6.—Dr. König communicated an experiment he had carried out in conjunction with Dr. Richarz, with a view to testing the ground of a misgiving expressed at a recent meeting of the Society in connection with a plan he had set forth for the purpose of determining the constants of gravitation (*vide* NATURE, vol. xxxi. p. 260). It was maintained that the lead block of 2000 centners would, on account of its weight, become extended at its base and consequently change its form—a circumstance which would prove very prejudicial to the experiments contemplated in connection with it. Dr. König and Dr. Richarz had, therefore, calculated the pressure exercised by the lead mass, which should have a basal plane of 1·9 square metres, on the square centimetre, and had found it equal to 2·3 kg. They then prepared a small lead cylinder, placed it with due underlayers on the earth, and by means of pulleys and weights caused a constant pressure of more than 6 kg. per square centimetre to be exerted on its smooth upper surface. Two fine steel spikes were fastened in the side of the lead mass, and their distance from each other exactly measured. After this pressure had been exerted for a considerable length of time on the lead, the distance of the two steel spikes from each other was again determined, and all the displacement which had occurred was found to be but 0·01 mm., an amount which might very well have been caused by differences of temperature. At all events it was so trifling, that in the case of a pressure three times less, such as would be that of the large lead mass utilised in the quantitative experiment, no deformation due to its own weight was to be apprehended.—Dr. König further reported on measurements of colour-sense and visual acuteness effected by him on a number of Zulus at present staying in Berlin. Their colour-sense was tested by means of the leucoscope. On the turning of the Nicol prism the savages stated distinctly that the colours of the two images became even more similar to each other, and at last almost alike, and that, on a further turning of the Nicol prism, the colours came to vary more and more from each other. The colour-sensibility of the savages was, therefore, equal to that of the normal eyes of civilised peoples. They distinguished with exactness, and denoted by different names the colours red, yellow, blue, brown, black, and white. While they distinguished as red only the purest spectral red, they denoted as yellow or as blue all objects having any yellowish, or, on the other hand, any bluish tinge. As "grass colours" they called the green, and violet they named after a mineral unknown to Dr. König. The unsaturated colours they defined by affixing a syllable to the name of the particular colour in each case, an affix signifying much the same as "young." The visual acuteness was measured by means of Snellen's writing tests, according to which the smallest characters used, when distinctly seen at a distance of 6·5 m., was equal to 1. From extensive statistical investigations in Germany the visual acuteness of a perfectly normal eye was found to average 1·75. The measurements taken with male Zulu adults showed, on the other hand, that they were able to recognise with certainty the smallest written characters at a distance of from 24 m. to 25 m.; a Zulu boy of about eight years showed a visual energy of only 1·50; and a Zulu woman a still lower value of visual force—a result which was, however, to be explained by the circumstance that the woman was squint-eyed, and had, moreover, clearly-ascertained obscurations of the cornea.—Following up this address, Dr. König intimated that, in the Physical Institute, experiments had been made by Dr. Uhthoff on the influence of light intensity on visual acuteness. From a large number of experiments it appeared that if the light intensity was taken as abscissa, and the degrees of visual acuteness appertaining to it as ordinates, then the resulting curve, in the case of the greatest visual acuteness answering to a good full illumination by day, ran parallel to the axis of the abscissa, falling, at first slowly and then rapidly, towards the null point. The mode of the sinking of the curve was different with different individuals. Under low light intensities differences occurred as much as 1 to 2. The visual energy became null shortly before the light intensity was null. In this respect likewise, however, there were differences in the case of different individuals, those possessing a greater acuteness of vision showing the visual energy at the null point under a greater light intensity than in the case of such persons as had a lower acuteness of vision, in whom the curve began nearer the null point of the abscissa. Normal eyes with greater acuteness of vision, under the highest light intensities attainable by means of a petroleum lamp, showed symptoms of dazzlement, and the curve sank to the axis of the abscissa. In the case of the eyes of much less visual acuteness the curve, even under these highest intensities, continued still parallel to the abscissa. In the discussion which this address gave rise to, Prof. von Helmholtz brought out and established, by entering into detail, that it was altogether unjustifiable to assume that the ancients had not such developed colour-sense as recent persons, and that this assumption was an inference quite unwarrantably drawn from the mere defect of names for the different colours.

February 20.—Dr. Kayser referred to a method published by M. Wolf in the *Comptes Rendus* for measuring the velocity of light, which differed from Foucault's experiment inasmuch as the rotating mirror was concave and the aperture admitting the light was a small transparent spot in a larger concave mirror. By Wolf's method the displacement of the reflection of the light could be made to reach as much as 1 m., and could be easily measured with precision.—Prof. Neesen made some communications respecting an investigation, which was not yet concluded, into Geissler's tubes. In an older tube with aluminium electrodes he found that the process of evacuation, up to the highest degree of rarefication, at which the electricity no longer passed through the tube, was rendered more difficult if continuous electric discharges were sent through the tube, but, on the other hand, was very easy when no electric current was transmitted. If, with high degrees of rarefication, phosphoric light filled the glass ball, a black precipitate was regularly formed on the glass, which disappeared on the admission of a small quantity of air into the tube. If the tube was put in communication with an electric lamp, and the carbon thread, after being kept in a glowing state for about an hour, was allowed to cool, a complete vacuum was more easily obtained, probably because the gaseous substances adhering to the glass were absorbed by the carbon. In such a case it was of no consequence for the evacuation whether a discharge was transmitted continuously through the tube or not. The phosphoric light, after the absorption by the carbon-thread, was likewise changed. Instead of being yellow and filling up the whole ball, it was rosy, limited, and soon disappeared. If the tube was then for some time exposed to the air and evacuated, yellow phosphoric light and the black precipitate again appeared. Prof. Neesen was of opinion that the process of phosphorescence was induced by substances which were absorbed by the glass and decomposed by the electric light, and that the black precipitate was a product of this decomposition.—Dr. Sklarek referred shortly to the measurement of the propagation velocity of electricity in telegraph wires, which Prof. Hagenbach, in Basel, had carried out according to a new method.

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